

**CLAIMS**

What is claimed is:

1. A coupling assembly for flexibly joining pipes to one another end to end and permitting relative axial, torsional and angular deflection between said pipes, said coupling assembly comprising:

a first ring attachable to an end of one of said pipes, said first ring having an outer diameter greater than said pipe and an outwardly facing circumferential groove therein;

a first sealing member positionable within said groove of said first ring and extending circumferentially therearound;

a second ring attachable to an end of another of said pipes, said second ring having an outer diameter greater than said other pipe and an outwardly facing circumferential groove therein;

a second sealing member positionable within said groove of said second ring and extending circumferentially therearound;

a band positionable in overlying relation with and surrounding said first and second rings, said band having an inwardly facing surface sealingly engageable with said first and second sealing members and having a width sufficient to allow a gap between said pipes; and

a housing positionable in overlying relation with and surrounding said rings and radially spaced apart from said band, said housing having a pair shoulders positioned in spaced apart relation, each said shoulder being engageable with one of said rings

for limiting axial and angular deflection of one pipe relative to the other.

2. A coupling assembly according to Claim 1, wherein one of said rings has an inner diameter sized to receive said pipe end in substantially coaxial engagement.

3. A coupling assembly according to Claim 1, wherein said housing comprises a plurality of housing portions attachable to one another end to end to extend around said pipe ends.

4. A coupling assembly according to Claim 1, wherein said housing comprises a pair of circumferential rims positioned in longitudinally spaced apart relation, each said rim extending radially inwardly and being in spaced relation to said pipes, said rims being engageable with said pipes upon angular deflection thereof for maintaining said spaced relation between said housing and said band.

5. A coupling assembly according to Claim 1, wherein said shoulders are positioned at a predetermined longitudinal distance from one another so as to engage said rings and thereby limit angular deflection between said pipes to a maximum of up to about 2°.

6. A coupling assembly according to Claim 1, wherein said shoulders are positioned at a predetermined longitudinal distance from one another so as to engage said rings and thereby limit angular

deflection between said pipes to a maximum of up to about 4°.

7. A coupling assembly according to Claim 1, wherein said rings are attached to said pipe ends by welding.

8. A coupling assembly according to Claim 1, wherein said sealing members comprise O-rings.

9. A coupling assembly according to Claim 1, wherein said band comprises a single piece.

10. A coupling flexibly joining pipes to one another end to end and permitting axial, torsional and angular deflection between said pipes, said coupling comprising:

a first ring attached coaxially around an end of one of said pipes, said first ring having an outwardly facing circumferential groove therein;

a first sealing member positioned within said groove of said first ring and extending circumferentially therearound;

a second ring attached coaxially around an end of another of said pipes, said second ring having an outwardly facing circumferential groove therein;

a second sealing member positioned within said groove of said second ring and extending circumferentially therearound;

a band positioned coaxially surrounding said first and second rings, said band having an inwardly facing surface sealingly engaging said first and second sealing members and having a width sufficient to allow a gap between said pipes; and

a housing coaxially surrounding said rings and said band, said housing being radially spaced apart from said band and having a pair of circumferential rims positioned in longitudinally spaced apart relation, each said rim extending radially inwardly and being in spaced relation with said pipes, said rims being engageable with said pipes upon angular deflection thereof for maintaining substantially co-axial, radially spaced relation between said housing and said band, said housing having a pair of shoulders positioned in spaced apart relation facing one another, said rings being positioned between said shoulders, each said shoulder being engageable with one of said rings for limiting axial and angular deflection of one pipe relative to the other.

11. A coupling assembly according to Claim 10, wherein said housing comprises a plurality of housing portions attached to one another end to end to extend around said pipes.

12. A coupling according to Claim 11, further comprising fasteners attaching said housing portions to one another.

13. A coupling according to Claim 10, wherein said shoulders are positioned at a predetermined longitudinal distance from one another so as to engage said rings and thereby limit angular deflection between said pipes to a maximum of up to about  $2^\circ$ .

14. A coupling according to Claim 10, wherein said shoulders are positioned at a predetermined longitudinal distance from one another so as to engage

said rings and thereby limit angular deflection between said pipes to a maximum of up to about 4°.

15. A method of sealingly and flexibly attaching pipes to one another end to end, said method comprising the steps of:

attaching a first ring to one pipe end, the first ring having an outwardly facing circumferential groove therein;

attaching a second ring to another pipe end, the second ring also having an outwardly facing circumferential groove therein;

inserting the first ring through a circumferentially extending band such that the band does not overlie the circumferential groove in the ring;

positioning a first sealing member within the groove of the first ring;

positioning a second sealing member within the groove of the second ring;

bringing the first and second rings adjacent to one another in co-axial alignment;

sliding the band circumferentially around the rings, the band having an inwardly facing surface sealingly engaging the first and second sealing members; and

positioning a housing circumferentially around and in spaced relation to the band and the rings, the housing having shoulders in spaced relation and facing one another, the shoulders being engageable with the rings to limit axial and angular deflection of the pipes relative to one another.